SECTION 709
GEOTEXTILE FABRICS

709.01 DESCRIPTION.

This work consists of furnishing and installing a geotextile fabric.

709.02 MATERIALS.

The geotextile fabric specified shall meet the requirements of Section 858.

709.03 CONSTRUCTION REQUIREMENTS.

A. **General.**

The surface receiving the fabric shall be smooth and free of stones, sticks, and other debris or irregularities that might puncture the fabric. The fabric shall be placed free of tension, stress, or wrinkles and shall be protected at all times during construction. Construction equipment shall not be operated on the fabric.

The fabric shall be overlapped a minimum of 18 inches at all splices or joints. In lieu of joint overlapping, multiple fabric pieces may be sewed if the seam strength meets the seam strength requirements listed in Section 858.01 A. A 401 stitch conforming to Federal Standard No. 751a shall be used for all seams. Overlapping "J" seams are required for field seams. All seams shall be sewn with two parallel stitch lines spaced approximately 1/4 inch apart. The outside stitch shall be placed approximately one inch from the edge of the fabric. The thread shall be of a material that meets the requirements specified for the fabric.

The geotextile fabric and a certification of compliance shall be delivered to the project at least 21 days prior to its incorporation into the work. Fabric shall be approved by the Engineer before installation.

If a fabric is tested and fails, any retests will be at the cost of the Contractor, unless the results of the retest show the fabric passes.

If the Engineer allows installation and the fabric fails to meet the specified requirements a minimum price adjustment of 20% will be assessed to the bid price for any fabric installed. Actual penalties will be determined by the Engineer, based on projected performance of fabric. If the failing fabric jeopardizes the integrity of the project, the fabric will be removed and replaced at the Contractor's expense.

If sewn seams are going to be used, the contractor shall also furnish a sewn seam sample, using the same geotextile fabric, thread, seam spacing and number, and overlap distance as are intended or required for use in the work.

To facilitate inspection and repair, the geotextile should be placed with all seams up.

Sheepsfoot rollers shall not be used for compaction until a minimum of 3 feet of fill is covering the geotextile.

Fabric shall not be left uncovered for longer than 5 days. Fabric that is not covered within 5 days shall be removed and replaced at the Contractor's expense.

The fabric shall be secured using the manufacturer's recommended methods to hold the fabric in place during the construction activities.

Before placing the material on the fabric, the Contractor shall demonstrate that the placement methods will not damage the fabric. The Engineer may order the removal of at least 4 square yards of material to inspect for fabric damage. Tears or rips in the fabric shall be patched with fabric lapped a minimum of 36 inches around the rip.

B. **Geotextile Separation Fabric.**

When placing the fabric, the geotextile shall be unrolled in line with the placement of the new aggregate. The fabric shall not be dragged across the subgrade. Fabric widths shall be used so overlaps of parallel rolls occur at the centerline and at the shoulders. Overlaps shall not be placed along the wheel path locations. The 18-inch overlap at the end of the roll shall be in the direction of the aggregate placement so the previous roll laps over the subsequent roll.

The first lift above the separation fabric shall have a minimum depth of 9 inches before compaction. When the first layer of aggregate is placed, construction equipment shall be limited in size and weight so rutting in the initial lift is less than 3 inches. If rutting does occur additional aggregate shall be placed to fill the ruts. The ruts shall not be bladed out. Construction equipment shall not be turned on the first layer of aggregate placed on the fabric.

C. **Filter Fabric (Underdrains).**

After the fabric has been secured in place, the aggregate shall be deposited by methods that will not tear, puncture, or reposition the fabric. The aggregate shall not be dropped on the fabric from a height greater than 3 feet.

The underdrain granular fill shall meet the gradation requirements of Section 816.02 A.1.

D. **Filter Fabric (Riprap).**

If more than one length or width of fabric is necessary, all joints shall be overlapped or sewn as required in Section 709.03 A.

When the fabric is used for scour or stream bank protection it shall be placed loosely and be unrolled in the direction of the anticipated water flow. If the fabric is overlapped, the overlap shall be placed so the upstream strip laps over the downstream strip. The laps along the length of the fabric, parallel to the waters edge, shall be placed so the upper strip overlaps the lower strip. All overlaps shall be pinned or stapled at three-foot intervals.

Fabric used to protect against wave action may be unrolled parallel or perpendicular to the waters edge. The joints or seams of all fabric placed parallel to the waters edge shall be sewn.

The riprap shall be deposited and spread over the fabric by methods that do not tear, puncture, or reposition the fabric. Riprap stones less than 250 pounds shall not be dropped on the fabric from a height greater than 3 feet. Stones greater than 250 pounds shall be placed with no free-fall. Contouring of the stones shall be achieved during their initial placement. The stones shall not be rolled along the surface. Placement of the stone cover shall begin at the base of the slope and at the center of the geotextile covered zone.

E. **Geotextile Reinforcement Fabric.**

When placing the fabric, the geotextile shall be unrolled in line with the placement of the new aggregate. The fabric shall not be dragged across the subgrade. Fabric widths shall be used so overlaps of parallel rolls occur at the centerline and at the shoulders. Overlaps shall not be placed along the wheel path locations.

The fabric shall be overlapped a minimum of 30 inches at all splices or joints. The 30-inch overlap at the end of the roll shall be in the direction of the aggregate placement so the previous roll laps over the subsequent roll.

The first lift above the reinforcement fabric shall have a minimum lift of 12 inches before compaction.

Small dozer equipment or front end loaders with low ground pressures shall be used to spread the cover material.

F. **Shipping and Storage.**

Geotextile labelling and identification shall comply to ASTM D 4873-95. If a label is removed during sampling or other reasons, the roll must be relabeled.

Packaging, handling, and storage of geosynthetics shall conform to ASTM D 4873-95 and the following requirements. Each Geotextile roll shall be wrapped with a waterproof cover or membrane for protection during shipping and storage. Geotextiles shall not be exposed to ultraviolet light for more than 14 days and shall be elevated off the ground during storage.

709.04 METHOD OF MEASUREMENT.

A. **Geotextile Separation Fabric.** The fabric used for separation and for riprap shall be measured by the actual surface area covered to the nearest Square Yard. No allowance will be made for overlaps, drainage trenches, or cutoff trenches unless otherwise shown on the Plans.

B. **Filter Fabric (Underdrains).** The fabric used for underdrains will be measured by the Square Yard, complete and in place, based on the dimensions shown on the Plans.

C. **Filter Fabric (Riprap).** Fabric used for riprap shall be measured by the actual surface area covered to the nearest Square Yard. No allowance will be made for overlaps, drainage trenches, or cutoff trench unless otherwise shown on the Plans.

D. **Geotextile Reinforcement Fabric.** The reinforcement fabric shall be measured by the actual surface area covered to the nearest square yard. No allowance will be made for overlaps.

709.05 BASIS OF PAYMENT.

The quantities measured as provided will be paid for at the Contract Unit Price complete and in place. Payment will be made under:

Pay Item	Unit
Geotextile Fabric Type ____	Square Yard

This payment will be full compensation for all labor, equipment, and materials necessary to complete the work.

SECTION 710
TEMPORARY BYPASS

710.01 DESCRIPTION.

This work consists of constructing, maintaining, and removing of roads, approaches, and structures necessary to provide a temporary road around construction operations. The temporary bypass shall be provided with adequate signs, barricades, warning lights, markers, and other traffic control devices for the protection and guidance of traffic according to Section 107, the laws of the State of North Dakota and the latest edition of the MUTCD.

The location of the temporary structure and bypass shall be approved by the Engineer.

710.02 CONSTRUCTION REQUIREMENTS.

The temporary bypass shall have a roadway width of not less than 24 feet, capable of carrying the legal load limit safely. It shall have a waterway opening sufficient to provide for the stream flow during the time the structure is in place. The type and details of the structure shall be the Contractor’s responsibility.

The temporary bypass and approaches shall be smooth, well drained, and shall have no grades greater than 7% without written permission of the Engineer. The roadways shall be maintained in a safe and passable condition at all times. When specified, surfacing shall be provided and maintained in a condition satisfactory for all-weather use. Any material required for maintenance of surfaced roadways shall be furnished at the Contractor’s expense.

The Contractor shall assume any and all liability for damage resulting from the neglect or failure to safeguard highway traffic or property.